ON TOOTH-MARKED BONES OF EXTINCT MARSUPIALS.

BY CHARLES W. DE VIS, B.A.

Whatever may have been the cause of the extermination of the herbivorous fauna of pliocene Australia, it is clear that while still in the zenith of its vigour, it was kept in check by carnivorous animals. About five per cent. of some hundreds of bones from the Darling Downs awaiting examination, are pitted, scored, cracked, chopped, and crushed by the teeth. They have in fragments passed with the fæces through the intestines of bone-eating beasts of prey. Fully eighty per cent. of the remainder tell, in their splintered fragmentary condition, the same tale of violence. On the one hand, there is piled up a heap of the heads of femurs—on the other are a few shafts, not one to the score of the heads. Of the shafts themselves, many were of young animals whose fallen epiphyses exposed a fairer grip to the jaws than was possible upon their rounder and harder surfaces Of predaceous animals as yet unanimously recognized in the drifts, the only one capable of crushing large shankbones, say of *M. Titian*, is the fossil dog of South Australia, identified by Professor McCoy, with *Canis Dingo*—and to a dog which may be *C. Dingo*, the majority of the groovings and indentations on the bones spoken of, are very likely due. The indentations are generally angular pits, showing on their sides and at their bottom, portions of bone crushed in from the surface, and on applying to several of these pits, the major cup of the great sectorial of the existing dingo, it is found to fit them satisfactorily, or even exactly. Pieces of long bone again show very distinct marks of gnawing-marks, faithfully copied by the teeth of our yard dogs on the bones they delight in. By way of confirming this interpretation of the tooth marks, it may be mentioned that a coprolite, probably that of a dog, contains a good sized fragment of bone. But the dog was not the only bone-eater of the period. There is distinct proof, accepted by all who have examined it, that *Thylacoleo* also was an ossiphagous animal. It is yielded by a mandible of a young kangaroo, *M affinis*, which has been seized in the middle between the jaws of a *Thylacoleo* with evident intention of crushing it. It was however, seized in an awkward fashion. On either side of the alveolar ridge, immediately in front of the ascending process, is a conspicuous impression of a tooth forced against the yielding bone. The characteristically grooved upper tooth of *Thylacoleo* on the inner—the smooth lower one on the outer side. As the beast's jaws met, their strength was resisted by the row of teeth brought directly between the edges of teeth closing upon it above and below, and the only effects produced beyond the impression on the bone, were the splintering of one of the kangaroo's teeth, and the longitudinal splitting of its jaw on the inner side, below the dental canal. The upper thylacoleonine tooth has left the mark of its whole length—the lower of that elevation only which is seen on the posterior third of its cutting surface. On the mind of the observer there remains no doubt, that the so termed "marsupial lion" was indeed a carnivorous animal, but though it might certainly have attempted the fracture of the victim's jaw for the sake of its investment of flesh, as the cat breaks and swallows the bones of her prey, yet the first idea suggested by the specimen that it was one of the many bones crunched for their own sakes, is probably the true one, and for this reason some of the long bones of kangaroos bear across them marks which at a glance might be mistaken for the effects of blows of a tomahawk—marks produced by long straight-edged incisive instruments, which sometimes struck more than once in same groove—in a word, just the marks that would be left by a pair of shear-like teeth, actuated by powerful muscles. No such teeth save those of the thylacoleo, are known. From the present evidence then, it would appear that there has been no mistake made in pronouncing the animal to have been a carnivor, but that it was a carnivor resembling in its habits of feeding, the hyæna rather than the lion. That opinion is strengthened by the form of the claws of which two perfect specimens, together with a third suggesting a feebler species, have been obtained from the Chinchilla beds. However destructive to the kangaroos, or at least to the weaker of them it may have been, its mission was chiefly that of a scavenger, and it could hardly have been an efficient agent in the extermination of the Nototheridæ.

Since the foregoing notes were penned evidence has occurred of the existence of another carnivor, which may after all have been the chief strewer of broken bones over pliocene ground. Most of us are aware of the ease with which that euphemistically named animal, the Tasmanian Devil, discusses bones of considerable size. *S. ursinus* has been proved to have been an inhabitant of South Australia in pliocene times by Professor McCoy, who notices the strangeness of the circumstance that it has survived in the island rather than on the mainland. The solubility of the enigma may not be increased by the probability that another and more powerful species of *Sarcophilus* lived at the same period in Northern Australia; but the full discovery of the fact will at least serve to explain in great part the matter under notice. The sole relic yet detected of this species (nominally *S. prior*) is the head with a little of the shaft of a right tibia. In *S. ursinus* the transverse and fore and aft measurements of the articular surface, including the deflected rotular process are equal—calling each of these 25, the measurements of *S. prior* are respectively, transverse 35, longitudinal 37—numbers indicating a greater size by one-half nearly, and a comparatively elongated head. The general form of the two bones is one, their peculiarities many. In both the cavity for the inner condyle is the deeper, but in *S. prior* it is proportionately more excavated than in *S. ursinus*, and it is differently situated. In the latter it is placed as backward as possible, its hinder border being the edge of the shaft—in the former it is brought more directly over the axis of the bone and a wide non-articular edge is left between it and the brim of the shaft. The outer cavity in *S. prior* is larger proportionately, but not deeper than in the recent species. The spine is considerably higher and stronger, and the ridge continued from it anteriorly, more sharply defined. The rotular process descending at the same angle is however longer, its edge is rather deeply emarginate. The intercondylar groove is deeper and extends on to the base of the spine. The fibular facet is further removed from the spine by the greater posterior expansion of the articular surface for the outer condyle. On the inner side of the shaft it may be noted that the depression bounding that side of the column supporting the part of the head above is filled up, but on the other hand that a ridge runs down the hind edge of the inner side of the shaft from near the brim of the cavity for the inner condyle. On the whole the bone gives the impression of a better knit, and more muscular animal, of a size too superior, to be included in the same species with *S. ursinus*—one whose last molar must have equalled, or nearly equalled in size, the great sectorial of a large dog and must have been fully competent to the work whereof so many traces have been left.

ON BRACHALLETES PALMERI AN EXTINCT MARSUPIAL.

BY CHARLES W. DE VIS, B.A.

A conspicuous feature in the skeletons of kangaroos is the inordinate elevation of the great trochanter of the femur. In the level of its apex above that of the 'head' of the bone there is an excess pervading the family, neither individual, specific, nor generic variation being carried to any great extent. The fact will appear more precisely evident if we measure the gluteal angle in several of the genera — and by gluteal angle is meant the angle made with the long axis of the bone by a straight line touching the top of the trochanter and the summit of the head. In *Macropus major* we find it to be 52° in *M. rufus,* 54° in *Halmaturus dorsalis,* 56° in the femur figured in the Foss. Mamm. of Aust. as that of *Palorchestes Azael,* it is 46° and in six other fossil species examined for the purpose it ranges from 60° to 45°. The value of this angle is the measure of the leaping ability of the animal, the propellers of the weighty trunk acting on the limb to be extended with a force proportionate, inversely to the inclination, and directly to the resultant length of the line of leverage. Whence we may conclude that any considerable depression of the trochanter is an index to concomitant modifications of the general economy sufficient to bring about at least very distinct generic differentiation. In this predicament stands a femur lately found